

International Green Building Adoption Index 2018

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INTERNATIONAL GREEN BUILDING ADOPTION INDEX

2018

CBRE



In partnership with
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**real
GREEN**
research challenge.

INTERNATIONAL GREEN BUILDING ADOPTION INDEX 2018

TABLE OF CONTENTS

Executive Summary	3
Markets	6
Appendix	17

EXECUTIVE SUMMARY

We have long understood that buildings, and especially commercial buildings, are at the forefront of many of society's most pressing issues. Water, waste, and significant energy use with the resultant carbon emissions, are each drawing the attention of a growing list of constituents and stakeholders. For example, governments have adopted ever-stricter building codes, comparable to fuel-efficiency standards for cars. Also, the European Union mandates the construction of zero-net energy projects by 2020 (by 2018 for public buildings). Occupiers are increasingly translating corporate carbon and Environmental, Social, and Governance (ESG) goals into requirements for the buildings they occupy, demanding efficient buildings and energy sourced from renewables. And finally, lenders are gradually starting to assess collateral on its energy efficiency, offering carrots such as reduced rates for more efficient buildings, and sticks for non-efficient buildings.

In the face of these issues, building owners have been progressively improving the environmental performance of their assets, but for those active in the commercial real estate market, it is challenging to assess the importance and diffusion of energy efficiency in the national or local market. How does this compare across markets? One way to measure the importance of energy efficiency in buildings is to assess the use of "green" building certification programs. Such certification programs have been in place, in various forms, for more than a decade across the global commercial property market. Although no green building certification program is the same, they all share basic characteristics, such as measuring energy performance, assessing a multitude of other dimensions of sustainability, and providing external certification through typically independent providers.

To discover how the market for "green" building has progressed over time and across markets, we developed a comprehensive, annual review, the [U.S. Green Building Adoption Index](#), a collaborative effort between CBRE and Maastricht University, detailing the growth and distribution of "green building" certifications in the top 30 US markets since 2005. In these annual reviews, published since 2014, we have measured the number and percentage of space in each market that has achieved a defined green building certification.

In this report, we are expanding the U.S. Green Building Adoption Index to the global real estate market, seeking to measure the adoption of green certification programs across several international real estate markets. Information on market size (number of buildings and/or square footage of space) is provided by the local teams of CBRE, while the numerator of each index includes a wide variety of "green" and energy certification schemes, such as BOMA BEST, BREEAM, DGNB, HQE, LEED, NABERS, and Green Star (see Appendix A for an overview of schemes). This International Green Building Adoption Index (IGBAI) is similar in spirit to the U.S. Green Building Adoption Index described above, and initially covers 10 cities in Australia, Canada, and Europe. Each market is covered in detail in this report, including a detailed discussion of the methodology.

KEY FINDINGS

In the 10 markets covered by this report, we document that 18.6 percent of space is now certified as "green". This represents more than 227 million square feet of green space, out of a total of 1.2 billion square feet of office space reviewed. This is a significant increase from just 6.4 percent a decade ago, in 2007. Market-specific details are below:

AUSTRALIA

- Melbourne: 29 percent of office space in the CBD was certified under the Green Star or NABERS program at the end of 2016, compared to just 1.4 percent at the end of 2006.
- Sydney: 46 percent of space in the CBD was certified under the Green Star or NABERS program at the end of 2016, compared to just 0.8 percent at the end of 2006.

CANADA

- Toronto: More than 50 percent of office space was certified under the BOMA BEST or the CAGBC LEED program at the end of 2016, compared to 15 percent at the end of 2006. Measured by number of buildings, the adoption of both programs increased from 2.5 percent at the end of 2006 to more than 20 percent at the end of 2016.
- Vancouver: Almost 52 percent of office space was certified under the BOMA BEST or CAGBC LEED program at the end of 2016, compared to 29 percent at the end of 2005. In number of buildings, the adoption of BOMA BEST and CAGBC LEED increased from 6.7 percent at the end of 2005 to approximately 24 percent at the end of 2016.

EUROPE

- Amsterdam: BREEAM-NL is the dominant rating program in Amsterdam. At the end of 2016, almost 11 percent of office space was certified under the BREEAM program, compared to just 0.2 percent at the end of 2011. The Amsterdam office market included only 2 LEED certified buildings by the end of 2016.
- Frankfurt: Two certification programs are used frequently in the Frankfurt office market: DGNB and LEED, with limited overlap. At the end of 2016, 13 percent of space was certified by LEED, compared to just 0.2 percent at the end of 2009. In comparison, at the end of 2016 5.1 percent of space was certified by DGNB, compared to 1.4 percent at the end of 2009.
- London: BREEAM is the dominant building rating scheme in London. Despite a high number of BREEAM certified buildings, the adoption levels for London are relatively low. At the end of 2016, 9 percent of office space in London was BREEAM certified.
- Paris: A variety of programs are used in the Paris office markets, although HQE is most prevalent. At the end of 2016, approximately 9 percent of office space was certified under HQE, BREEAM, or LEED, compared to just 0.1 percent at the end of 2007.
- Stockholm: LEED is the dominant rating program in the Stockholm office market. At the end of 2016, almost 12 percent of space was LEED certified, compared to just 1.2 percent at the end of 2009. Only one building in the office market is certified by BRE.
- Warsaw: Like Frankfurt, both BREEAM and LEED are frequently employed in the Warsaw office market, although again with limited overlap between both programs. At the end of 2016, 12 percent of office space was certified under the BREEAM program, compared to just 1.2 percent at the end of 2011.

UNITED STATES

- New York: For comparison purposes, we include the 2016 data from the U.S. Green Building Adoption Index. In 2016, 20.2 percent of the Manhattan office market was certified by LEED, compared to just 0.3 percent in 2006.

LIMITATIONS

The numbers in the International Green Building Adoption Index come with some qualifications. This report includes certification data on office buildings only and other property types are excluded. We further exclude owner-occupied or government buildings. In line with the CBRE definition, we filter out all green-certified assets that are deemed "illiquid." Finally, CBRE typically covers just the central business district and parts of a city with significant office market activity. We only include green-certified assets within the CBRE market boundaries.

It should be further noted that, unlike the US markets reported on in our prior work, these global markets are not consistent in data or approach. Our ability to measure total stock per market varies and market boundaries are often indistinct, while the definition of "liquid space" tracked by CBRE varies across markets. Green certification programs often include many owner-occupied and government buildings, which are manually excluded from our measure of green stock per market. Some markets provide detailed information on building count and building square footage, while some markets only measure space, but not the number of buildings. Finally, address data is often inconsistent from development to project completion.

As with the U.S. Green Building Adoption Index, many of these initial issues will be addressed and resolved in the coming years. We believe that this report provides some good first insights into what has become a global phenomenon: green building certification.

Australia

The latest IPD Australia Green Property Digest figures (Q2 June 2017) looked at the correlation between green buildings and total asset return. It demonstrated that green buildings (i.e. those rated with a high Green Star and/or NABERS rating) typically saw an increased financial return. For example, the total 3-year annualized return for Green Star 6 Star-rated office buildings was 15.6 percent compared to a 12.8 percent total return for the remainder of the market. However, it should be noted that this cannot be solely attributed to the Green Star rating alone. Higher Green Star rated assets are also generally Premium assets, with a much more sophisticated amenity package which attracts more sophisticated tenants willing to pay premium rents. These occupiers are typically seeking the amenities and quality of assets this rating often represents, including the sustainability credentials.

GREEN BUILDING TRENDS

NABERS

In 2016/17, 10 office buildings achieved a 6 Star NABERS Energy Rating for their Base Building performance. This more than doubled the number from 2015/16.

- 1,264 buildings were rated by NABERS nationwide, a 9.2 percent increase on the previous year
- The average star rating was 4.3, a 1.8 percent increase on the previous year
- The average energy intensity (base building only) was 466MJ/square meter, a 0.3 percent decrease from last year.

Some notable new developments in Australia with 6 star Green Star Design & As Built v1 ratings and 5 star NABERS Energy include 447 Collins Street Melbourne (Cbus Property), International Towers Sydney (Lend Lease), Barangaroo Sydney (Lend Lease), 200 George Street Sydney (Mirvac)

Net Zero/Carbon Positive

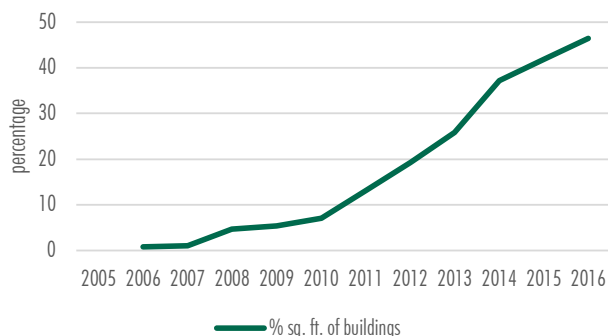
The real estate industry has been collaborating on a roadmap to Net Zero/Carbon Positive to provide some level of mitigation of climate change. Current trajectories show the region's existing buildings will need to reduce consumption by 3% annually to meet science based targets by 2050, and new buildings 7 percent annually by 2030. Property Council of Australia, Green Building Council of Australia and NABERS (Office of Environment & Heritage) have recently launched the National Carbon Offset Standards suitable for precincts, as a framework to carbon neutral certification. In line with this, NABERS has been working on increasing the benchmark of their rating tool to 7 stars for a carbon neutral property, while GBCA has been working on updating their existing rating tools to provide a framework for institutional landlords to design/operate buildings in line with a Carbon Positive aspiration for 2050.

Wellness

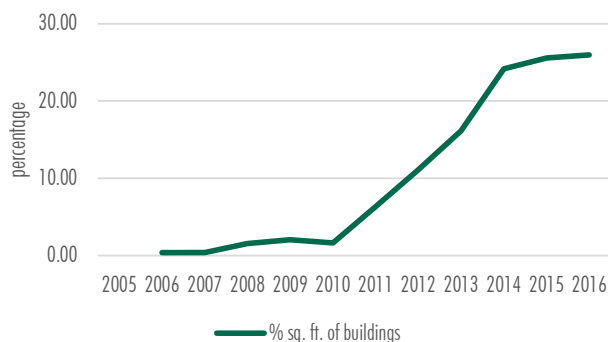
There is growing interest in the Australian market in the new WELL Building Standard. There has been considerable interest in health and wellbeing initiatives in this region for a number of years (predominantly in placemaking, indoor air quality, etc.) but with no defined framework to follow. WELL provides that framework. However, cost and local market applicability of the tool have thus far curtailed uptake. To date there are 34 WELL-registered projects in Australia, and 3 WELL-certified projects. Notwithstanding these numbers, we are seeing most new developments applying WELL principles to their design or seeking full certification. Consequently, the number of certified projects is expected to spike in 2019/2020 once these projects are finished.

Sydney CBD 2016	% sq. ft. of Buildings
Total	46.45
NABERS	25.97
Green Star	25.82

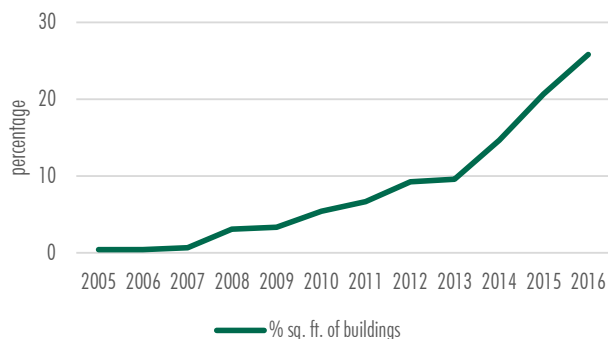
Total Adoption



NABERS Adoption



Green Star Adoption



Australia

SYDNEY

The Sydney CBD office market as defined and covered by CBRE includes about 55 million square feet of space. By the end of 2016, 25.4 million square feet of space was certified by either Green Star or NABERS (with a rating of least 5 Stars), representing 46.5 percent of the office stock. This was up from virtually zero (0.8 percent) in 2006. By the end of 2016, 25.8 percent of office space in Sydney was Green Star certified - 42 commercial office buildings representing 14.1 million square feet of space. At the same time, 26 percent of office space was certified by NABERS (54 buildings, or 14.2 million square feet), reflecting relatively limited overlap between the two programs.

MELBOURNE

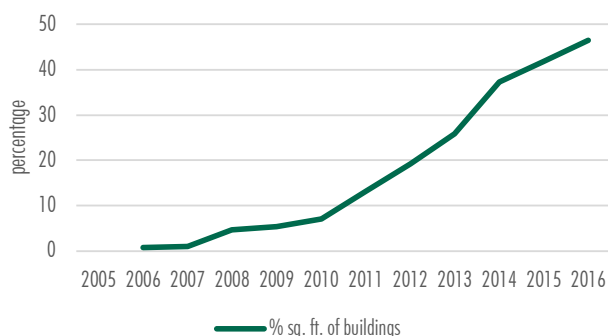
The Melbourne CBD office market covers about 49 million square feet of space, only slightly smaller than the Sydney CBD market. The adoption of green-certified space is significantly lower than in Sydney, with 28.8 percent of the commercial office market certified by either Green Star or NABERS (with a rating of least 5 Stars) at the end of 2016. The difference with Sydney is particularly stark for NABERS, which saw its first certifications in the Melbourne market in 2010 only. At the end of 2016, 14.6 percent of the market was certified with a NABERS rating of at least 5 Stars, and 18 percent of the market had received a Green Star rating.

METHODOLOGY

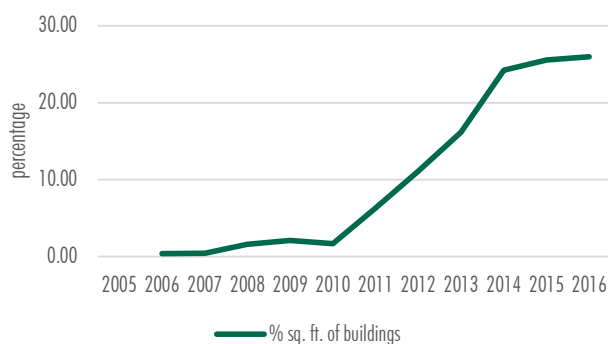
Green Star and NABERS are the two green building certification schemes that are most prevalent in the Australian office market. NABERS is a government program that initially focused solely on energy performance. Green Star, administered by the Green Building Council of Australia, provides a more holistic view on the sustainability performance of buildings. Both schemes have been around for more than a decade, and are widely adopted by commercial real estate owners. The green building adoption indices for Melbourne and Sydney include office buildings certified under the Green Star and NABERS program only. We include all certified assets within the CBRE market boundaries of the CBD in each market. Information on the number of buildings in each market is not available. For the NABERS program, we only consider buildings that received a rating of 5 Stars or more, buildings certified as "Whole Building" or "Base Building." We exclude "Tenancy" projects. For Green Star, we include buildings certified under the "Office" or "Performance" programs. Projects certified under the "Interiors" program are excluded. We apply a 5-year label window for Green Star and a 2-year label window for NABERS. All government-owned structures are removed from the set of NABERS assets. The adoption curves reflecting the sum of both programs have been corrected for assets holding both certifications.

Melbourne CBD 2016	% sq. ft. of Buildings
Total	28.84
NABERS	14.61
Green Star	18.03

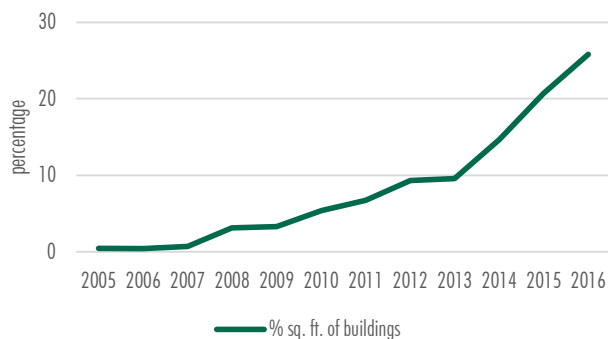
Total Adoption



NABERS Adoption



Green Star Adoption



Toronto

The pursuit and integration of both LEED and BOMA certifications in the greater Toronto area (GTA) office market has been rapid over the past 10 years. In 2016, 9 office complexes became LEED certified, including the Yonge Corporate Centre, 200 King Street West and 120 & 130 Adelaide Street West, of Oxford's Richmond-Adelaide Centre.

Landlords utilize green building certification to attract and retain tenants in the face of increased competition created by the influx of top-tier new supply. Many owners of existing Class A product downtown, which are at the highest risk of losing tenants to these new buildings, are undergoing capital-intensive improvements which often incorporate green building standards. For example, Dream's Scotia Plaza underwent a CAD 90 million retrofit in advance of nearly 15 percent of the building becoming vacant in 2017. Oxford's Royal Bank Plaza and Bentall Kennedy's 121 King West, among other buildings, are also undergoing major building system retrofits.

GREEN BUILDING TRENDS

Innovative green technologies are being incorporated into most new office developments Downtown. Oxford's LEED Platinum RBC WaterPark Place, which was completed in 2014, features deep lake water cooling, insulating window glazing and an outdoor air separation system. These and other similar features benefit tenants and landlords in several ways. In addition to being more environmentally-friendly, LEED-certified buildings Downtown currently command higher net rental rates (CAD 28.46 per square foot) than the Downtown average (CAD 26.53 per square foot.).

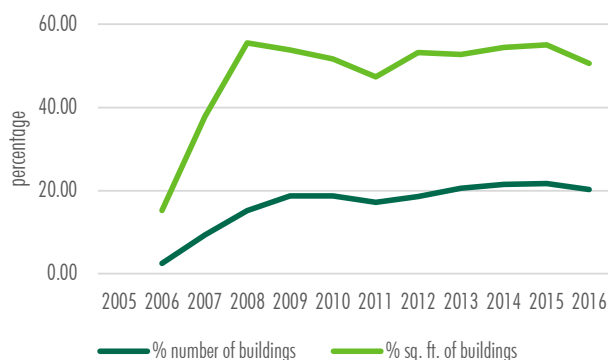
In the GTA suburban office market, specific demand for LEED-designated buildings is more limited. Although LEED/BOMA BEST buildings can be beneficial to both occupier and agency sides of the business, economic considerations are often viewed in higher priority. Demands for these buildings often come from larger tenants or global brands who are both looking to improve their corporate image.

RESULTS

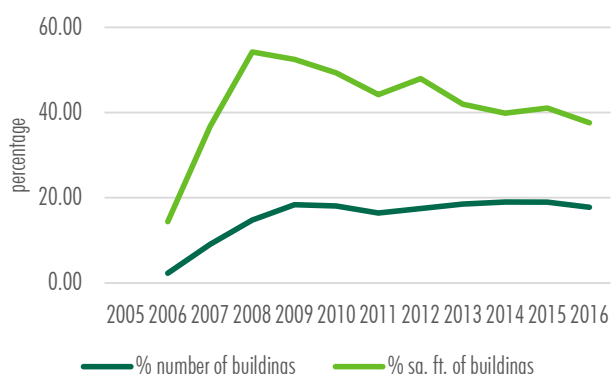
The Toronto office market includes 1,293 office buildings with about 160 million square feet of space. By the end of 2016, 261 buildings were certified by either BOMA BEST or by LEED, representing 20 percent of the office stock. Measured by square footage, the uptake of green building certification is much higher: 51 percent, or 81 million square feet of office space. Larger buildings are more likely to be certified. By the end of 2016, 34 percent of office space in Toronto was LEED certified, while 38 percent of office space was certified by BOMA BEST. Measured by number of buildings, LEED certified buildings represented 6.5 percent of the office stock in Toronto, compared to 17.8 percent for BOMA BEST rated buildings

Toronto 2016	% sq. ft. of Buildings
Total	50.55
BOMA BEST	37.60
LEED	33.53

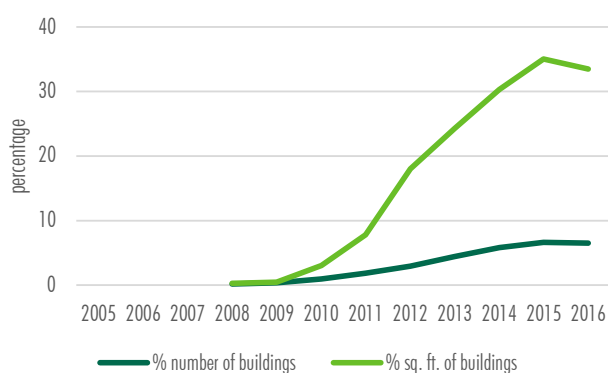
Total Adoption



BOMA BEST Adoption



LEED Adoption



Vancouver

Vancouver has made significant progress towards its goal of becoming the greenest city in the world by 2020, and this enthusiasm has also spurred development in the suburbs of the region. Recent examples include the construction of bicycle lanes through Downtown Vancouver, the expansion of rapid transit, such as the newly completed Evergreen Line, and the requirement that all new building re-zoning approvals must meet a minimum LEED Gold design standard.

GREEN BUILDING TRENDS

In 2016, three office buildings were completed in the suburbs of Vancouver, all of which were built to LEED Gold standard. These recently completed office developments have fared very well and have successfully attracted a diverse range of new tenants, including Intel Corporation, Capcom, and the Health Employers Association of British Columbia. Furthermore, this new stock has provided long term existing users the opportunity to relocate to a new generation of buildings giving them an opportunity to re-evaluate their workplace strategies.

In addition to the improvement of the physical conditions of the workplace, such as better air quality and increased natural lighting, a growing number of employers are placing more emphasis on locating near rapid transit stations that offer a vast range of amenities. This is in direct response to the shifting demographics of the workplace, coupled with increasing competition to attract and retain top tier talent. Looking forward, green buildings in Vancouver show no signs of slowing down as there are currently 14 office buildings under construction (1.5 million square feet.), seven of which are being built to a LEED Gold standard or higher.

In 2016 the average net rental rate for LEED-certified office buildings in the downtown core was CAD 29.77 per square foot., which was 9.2% higher than the downtown average of CAD 27.27 per square foot.

RESULTS

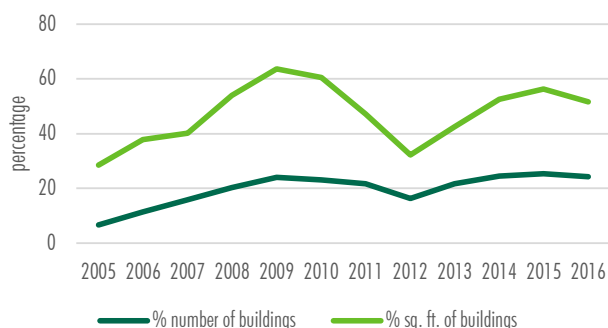
The Vancouver office market is about a quarter of the size of the Toronto market, with 559 office buildings covered by CBRE, representing 47 million square feet of space. The adoption of green building certification is slightly higher than in Toronto, with 24.3 percent of office buildings certified by either BOMA BEST and/or LEED. Measured by square footage, this represents 51.6 percent of the leasable space. Although growing rapidly, the adoption of LEED certification lags adoption of BOMA BEST. At the end of 2016, 25.6 percent of office space in Vancouver was LEED certified, compared to 46.1 percent of office space certified by BOMA BEST.

METHODOLOGY

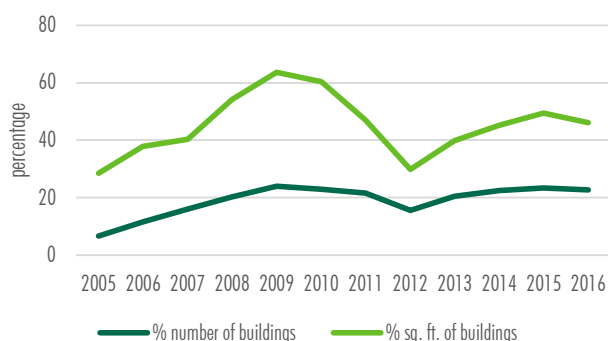
The green building adoption indices for Toronto and Vancouver include the BOMA BEST and LEED rating programs only. We include all certified assets under both programs within the CBRE market boundaries for each market. In addition, for both markets a tracking threshold of 20,000 square feet is applied. The BOMA certification information may include a number of mixed-use assets. We control for this by removing the obvious outliers (convention centers, shopping centers, government buildings, etc.) Regarding LEED, we only include office buildings from commercial owners. Moreover, we exclude all LEED for Commercial Interiors certifications. We apply a 5-year label window for both BOMA and LEED, which means that buildings "lose" their certification status after 5 years. The adoption curves reflecting the sum of both programs have been corrected for assets holding both certifications.

Vancouver 2016	% sq. ft. of Buildings
Total	51.63
BOMA BEST	46.14
LEED	25.56

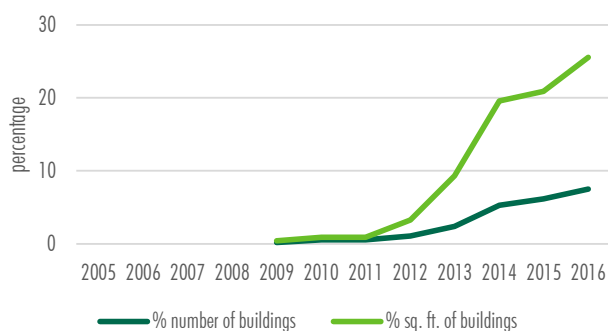
Total Adoption



BOMA BEST Adoption



LEED Adoption



Amsterdam

The greater Amsterdam region has continued to trend along a trajectory characterized by good take up volumes, dropping vacancy rates and higher rent levels in the prime submarkets.

Significant volumes of older office space have been transformed over the last few years from office to either housing or hotels. In conjunction with rising take up volumes (2016 showed a post crisis record of 3.9 million square feet) this has led to vacancy coming down considerably from around 16% early 2014 to roughly 8% vacancy for the entire greater Amsterdam region in 2017 Q1.

Prime rents rose sharply in the past 1.5 years with EUR 395 now being the prime rent level for Zuidas office space in Q1 2017 (Zuidas prime rents were at EUR 350 in Q1 2016). As high-quality office space becomes increasingly scarce at prime locations, tenants will start to look for office space in secondary submarkets. With modern high-grade office space becoming scarcer throughout the entire Amsterdam region, rent levels that have remained relatively stable in many secondary Amsterdam submarkets, might also start to show upward adjustment.

GREEN BUILDING TRENDS

The transformation of lower grade office stock, along with 2.2 million square feet currently being renovated (specifically in Amsterdam Southeast) means that older stock is being replaced with higher grade office stock. A prominent example of a green building in Amsterdam is the completion of "The Edge" in 2015 at the Zuidas. This energy neutral office building received a BREEAM score of 98.4 percent and at completion was awarded the status of most sustainable office building in the world. Significant deployment of solar panels and smart use of rainwater allow the Edge to function entirely energy neutral.

RESULTS

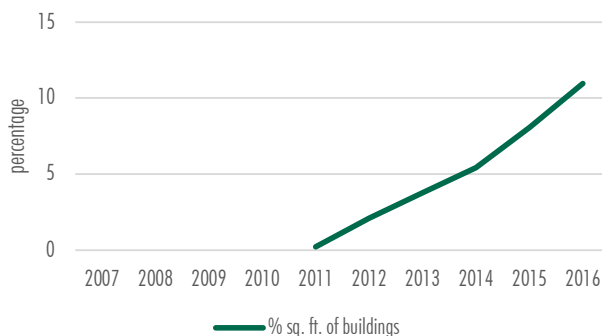
The Amsterdam office market as defined and covered by CBRE includes about 73 million square feet of space. By the end of 2016, 8 million square feet of space was certified by either BREEAM or LEED, representing 11 percent of the office stock. This was up from virtually zero (0.1 percent) in 2011. By the end of 2016, 10.9 percent of office space in Amsterdam was BREEAM certified - 32 commercial office buildings representing approximately 8 million square feet of space. At the same time, 1.4 percent of office space was certified by LEED (2 office buildings, or approximately 1 million square feet), with one building holding both certifications. (In 2016, there were 5 LEED-certified assets in Amsterdam, but only two are included within the market as defined and covered by CBRE)

METHODOLOGY

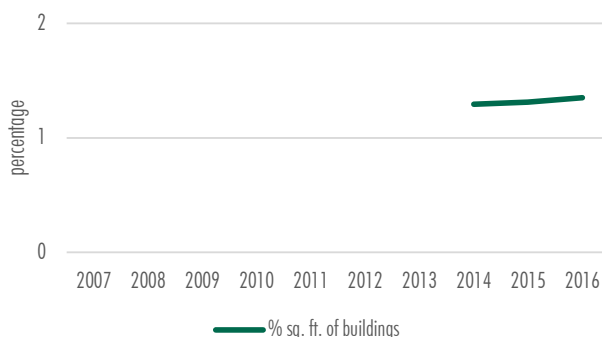
The green building adoption index for Amsterdam includes office buildings certified under the BREEAM and LEED programs only. We include all certified assets within the CBRE market boundaries of the market. Information on the total number of buildings in the market is not available, just the total square meters. We apply a 5-year label window for both BREEAM and LEED. For BREEAM we only include "Final" certifications, all "Interim" certifications are excluded from the analysis. We exclude LEED for Commercial Interiors, focusing the analysis on LEED for New Construction, Core and Shell, and Existing Buildings. Moreover, we only include LEED and BREEAM-certified buildings that are owned by a corporate owner, investor, or for-profit organization.

Amsterdam 2016	% sq. ft. of Buildings
BREEAM	10.97
LEED	1.35

BREEAM Adoption



LEED Adoption



Frankfurt

In the first nine months of 2017, the Frankfurt office market saw absorption of 4.6 million square feet in total. About one quarter of the total take-up volume was registered as leasing activity in a certificated green building (e.g. DGNB, LEED, BREEAM etc.).

GREEN BUILDING TRENDS

In the office submarkets, most take-up of green buildings was registered in the Banking District (422,000 square feet), followed by Frankfurt West with 194,000 square feet. Office Location / Niederrad (129,000 square feet) and Westend (128,000 square feet) are ranked at fourth and fifth place respectively.

In the business sector, Other Services are the most active occupier (171,000 square feet) of space in green buildings, followed by the IT-sector with 152,000 square feet in green buildings. The Legal Advisor / Chartered Accountant (146,000 square feet) and Banking / Financial Services sectors (144,000 square feet) are ranked at third and fourth place respectively. The largest letting transaction in 2017 in a certified green building was in Mainzer Landstrasse (submarket West) with more than 151,000 square feet office space let to the city administration of Frankfurt. This building was constructed in 1991 and the city of Frankfurt is now the main tenant of this office building. The second largest transaction occurred when the Federal Bank of Germany signed a lease for an additional 75,000 square feet in the high-rise building Trianon, built in 1993 and located in the heart of the Banking District. Letting deals in green buildings with the highest rental rates were signed in two new development projects in the Maintor area, called WinX and Panorama, as well as in the landmark building TaunusTurm.

RESULTS

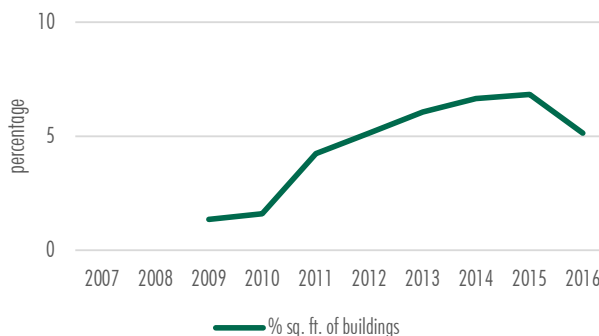
The Frankfurt office market includes about 118 million square feet of space, measured by year-end 2016, and as defined by CBRE. The two main certification schemes of choice are DGNB and LEED. At the end of 2016, Frankfurt had 17 DGNB-certified office buildings, representing 6.3 million square feet of space, and 33 LEED-certified buildings, representing 15.5 million square feet, with just three buildings holding both ratings. That equals 17.5 percent of the Frankfurt office market being certified by DGNB or LEED at the end of 2016. Differentiating between both rating programs, DGNB represents 5.1 percent of certified space and LEED 12.6 percent. The diffusion of both green certification schemes is up starkly from 2009, when just 1.4 percent of the market was DGNB-certified, and 0.2 percent was LEED-certified.

METHODOLOGY

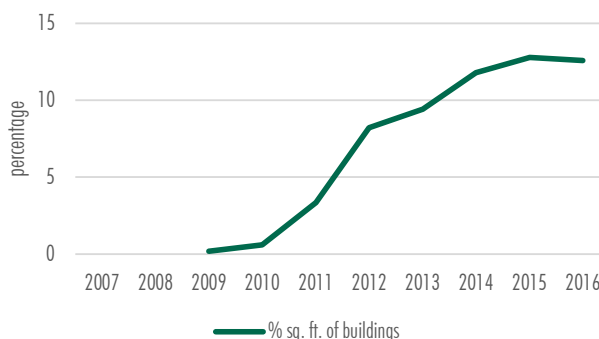
The green building adoption index for Frankfurt includes office buildings certified under the DGNB and LEED programs only. We include all certified assets within the CBRE market boundaries of the Frankfurt market. Information on the total number of buildings in the market is not available, just the total square meters. We apply a 5-year label window for both DGNB and LEED. We exclude LEED for Commercial Interiors, focusing the analysis on LEED for New Construction, Core and Shell, and Existing Buildings. Moreover, we only include LEED and DGNB-certified buildings that are owned by a corporate owner, investor, or for-profit organization. We disregard mixed-use assets in the DGNB information.

Frankfurt 2016	% sq. ft. of Buildings
DGNB	5.13
LEED	12.56

DGNB Adoption



LEED Adoption



London

Take up in Central London for Q3 2017 was 3.4 million square feet, an increase of 3 percent on the previous quarter and 10 percent above the 10-year average. After a lull in the middle of 2016, linked to uncertainty around the EU referendum, demand has generally strengthened and absorption for 2017 is around 8 percent up on the corresponding period of 2016. There were four deals over 100,000 square feet in Q3, the largest of which was a pre-let of nearly 550,000 square feet in the City market. "Under offers" decreased by 7 percent to 3.3 million square feet, but remained above the 10-year average of 2.8 million square feet.

Availability stabilized in the first half of 2017, having risen more sharply in the second half of 2016. These shifts have left availability below the 10-year average of 14.8 million square feet, although the vacancy rate is still higher than it was a year ago. Prime rents are experiencing downward pressure in the West End and to a lesser extent the City market, although this trend has yet to spread to other parts of central London.

GREEN BUILDING TRENDS

Developed in the United Kingdom by the Building Research Establishment (BRE), BREEAM was the first green building rating system when it entered the market in the mid-1990s. Two decades and strong industry support has enabled significant growth of the rating; BREEAM is now commonplace in local authority planning requirements, and both investors and occupiers are turning to voluntary certification as a method of benchmarking performance and standing out ahead of the competition.

To date, 18 office buildings have achieved a BREEAM Outstanding - the scheme's highest rating. These include Canary Wharf Group's 1 Bank Street, Argent's 3 Pancras Square, and the University of Oxford's Big Data Institute. In 2016, large pre-let's at BREEAM Excellent rated assets included Wells Fargo's 228,000 square feet deal at 33 Central and a 59,000 square feet deal at The Bower by WeWork.

RESULTS

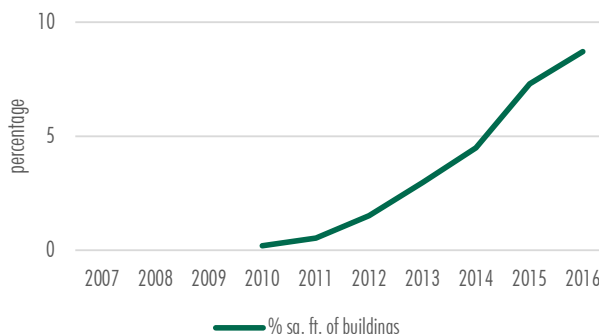
The London office market is the second largest market in the CBRE Global Green Building Adoption Index, with CBRE covering 226 million square feet of office space. BREEAM is the dominant green building certification program, with 232 BREEAM-certified buildings at the end of 2016, representing about 19.6 million square feet, or 8.7 percent of the office market. While BREEAM certification started three decades ago, reliable data is available since 2010 only. In that year, only a handful of buildings were BREEAM-certified, covering a negligible 0.2 percent of the market. By the end of 2016, LEED-certified assets represented only a small part of the market, some 0.3 percent. Two buildings are certified under both BREEAM and LEED.

METHODOLOGY

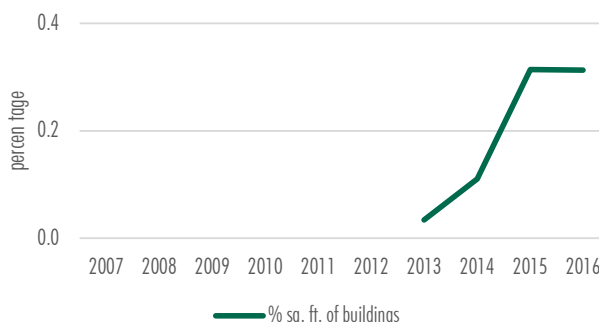
The green building adoption index for London includes office buildings certified under the BREEAM and LEED programs only. We include all certified assets within the CBRE market boundaries of the London market. Information on the total number of buildings in the market is not available, just the total square footage. We apply a 5-year label window for both BREEAM and LEED. For BREEAM we only include "Final" certifications, all "Interim" certifications are excluded from the analysis. Some BREEAM-certified buildings have missing size information. Therefore, we are not able to include those in our estimations. We exclude LEED for Commercial Interiors, focusing the analysis on LEED for New Construction, Core and Shell, and Existing Buildings. Moreover, we only include LEED and BREEAM-certified buildings that are owned by a corporate owner, investor, or for-profit organization.

London 2016	% sq. ft. of Buildings
BREEAM	8.71
LEED	0.31

BREEAM Adoption



LEED Adoption



Paris

GREEN BUILDING TRENDS

The [CBRE Green Views](#) report (cartographic and quantitative analysis of green building certifications) highlights trends for each property type. Environmental certification is part of a recent movement in the Île-de-France region (since 2008). We observe that certification for new operations is becoming widespread. This should make it possible to significantly upgrade the performance of the existing stock in the future. The outskirts now have a significant amount of office surface area that is energy efficient and eco-friendly. This could meet the expectations of major tenants.

La Défense

With its numerous high-rises that provide high quality office space, La Défense is an area that is active in green building. Often criticized for their high energy consumption, assets in this submarket are evolving. They are increasingly designed to reduce their impact on the environment as well as their energy consumption.

Since 2010, the number of certified buildings has increased dramatically, all new or structurally renovated office properties delivered are now certified. The number of properties with a double certification is significant. Owners and investors are keen to respond as best as possible to their international clients' expectations, they are looking for a foreign certification (BREEAM or LEED), in addition to the French HQE certification.

CBD of Paris

With its Haussmann-style buildings and virtually non-existent buildable land, the CBD is not a sector that necessarily springs to mind when considering green building activity. And yet, the tertiary real estate market in this sector is evolving, becoming more environmentally friendly and energy efficient.

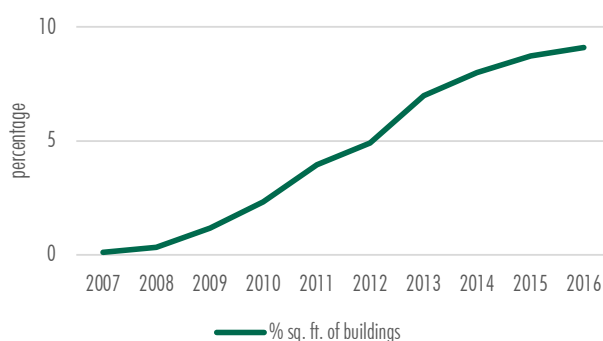
The current number of commercial assets that are certified by HQE remains very low, and represents only a small share of total office space surface area in the CBD. Notwithstanding that fact, all deliveries of new or structurally renovated office properties since 2012 have been certified.

RESULTS

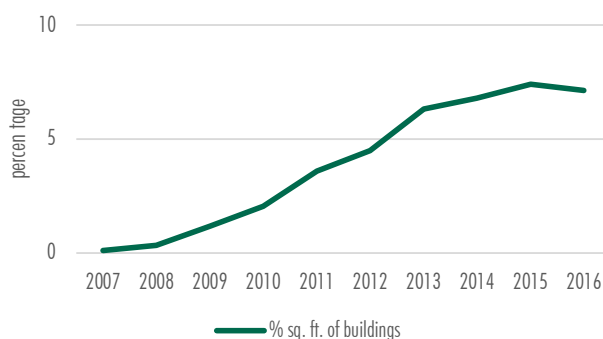
The Paris office market is the largest market included in the International Green Building Adoption Index, with 29 million square meters of space included within the CBRE market boundaries for Paris. The Paris market features three different certification schemes: HQE, BREEAM, and LEED. At the end of 2016, 175 commercial office buildings had received a certification under either one of these programs, representing 2.6 million square meters of space - 9.1 percent of the total office market. This was up from just 29,000 square meters of certified office space in 2007. HQE-certified buildings represented 2.1 million square meters of space, or 7.1 percent of the market. BREEAM adoption stood at 1.6 percent, or 464,000 square meters of space. LEED adoption rates are quite similar to BREEAM, at 1.5 percent or 443,000 square meters. There is some overlap between the three programs: 16 buildings hold both a HQE and BREEAM rating, while out of the 13 buildings that hold a LEED certificate, 8 also hold a HQE certificate.

Paris 2016	% sq. ft. of Buildings
Total	9.09
HQE	7.12
BREEAM	1.61
LEED	1.54

Total Adoption



HQE Adoption

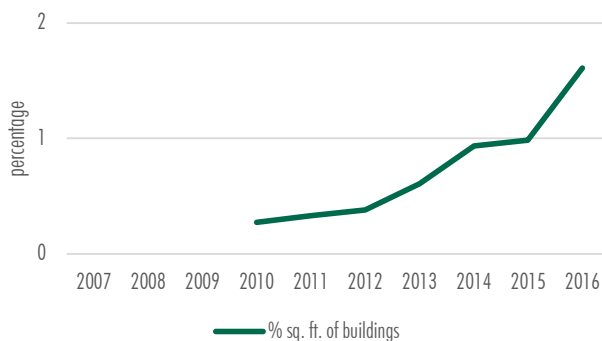


Paris

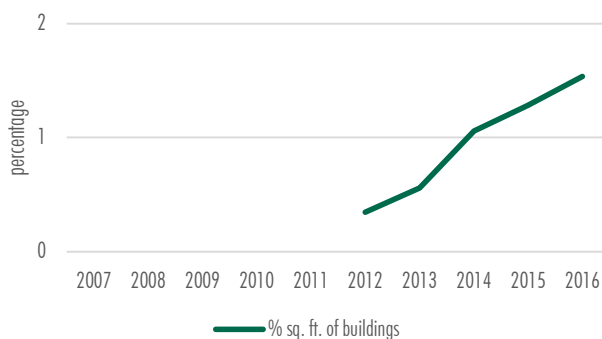
METHODOLOGY

The green building adoption index for Paris includes office buildings certified under the HQE, BREEAM and LEED programs only. We include all certified assets within the CBRE market boundaries of the Paris market. Information on the total number of buildings in the market is not available, just the total square meters. We apply a 5-year label window for HQE, BREEAM and LEED. For BREEAM we only include "Final" certifications, all "Interim" certifications are excluded from the analysis. Some BREEAM-certified buildings have missing size information. Therefore, we are not able to include those in our estimations. We exclude LEED for Commercial Interiors, focusing the analysis on LEED for New Construction, Core and Shell, and Existing Buildings. Moreover, we only include HQE, LEED and BREEAM-certified buildings that are owned by a corporate owner, investor, or for-profit organization. The total adoption index created for Paris corrects for overlap between the three programs

BREEAM Adoption



LEED Adoption



Stockholm

As Sweden's capital, Stockholm benefits from excellent transportation infrastructure including first rate road and rail connections, a well-established urban public transportation network and the country's largest airport, Stockholm Arlanda International Airport. Stockholm will benefit from significant infrastructure projects over the short, medium and long term. Stockholm has the highest Gross Regional Product (GRP) in Scandinavia and one of Europe's highest GRP per capita. Strong growth in employment figures and a high per capita income underscores the city's vitality and economic importance in this part of Europe.

The office rental market continues to perform well. Strong demand puts downward pressure on vacancy rates in most office markets, and the rental levels are higher than ever. Prime office rent in the CBD has accounted for the largest increase, 10% on a yearly basis. For Q3 2017 the average prime rent in the CBD was SEK 70,000 per square foot. The current prime yield is at a record low and the rental levels are the highest recorded, boosted by the relatively strong economy and very limited vacancy.

Few new development projects and a continued high demand for modern, efficient and flexible space are causing occupiers to look for good quality office space outside the CBD. The borders of what is perceived to be a central office location are being pushed outwards. Between 2017 - 2019 approx. 4.5 million square feet of new and refurbished office space will be completed in Stockholm, of which some 65% is pre-let. The pipeline is significantly concentrated in large schemes in Solna/Sundbyberg, the south suburbs and the CBD.

GREEN BUILDING TRENDS

Stockholm is one of the world leaders in sustainable building, urban development and infrastructure. The interest among property owners for environmentally certified assets continues to increase. More and more landlords offer certified buildings. Moreover, an increased shared ambition between landlords and tenants to reduce the environmental impact is observed. The tenants' environmental awareness has matured and has an impact in their future location choices and they are usually willing to pay a little extra for a green lease. A green lease is a way to ensure that environmental issues are raised at each meeting between the property owner and the tenant. The content is usually tailored to the needs of the tenant and may include source sorting, cleaning without toxic chemicals or purchase of green electricity.

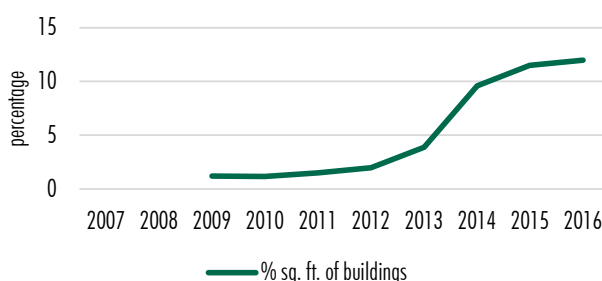
It's also of great importance to develop and own environmentally certified buildings, as they command a higher value in the domestic as well as in the foreign investment market.

RESULTS

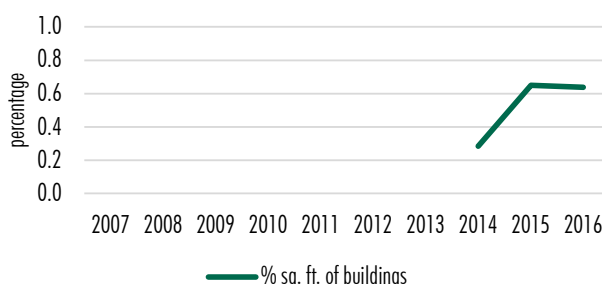
The Stockholm office market, as defined and covered by CBRE, includes 124 million square feet of space. Both BREEAM and LEED are used in the Swedish property market. By the end of 2016, 15.6 million square feet of space was certified by either BREEAM or LEED, representing 12.6 percent of the office stock. This was up from only 1.2 percent in 2011. By the end of 2016, 12 percent of office space in Stockholm was LEED certified - 55 commercial office buildings representing 14.8 million square feet of space. At the same time, 0.6 percent of office space was certified by BREEAM (3 office buildings, or 789,000 square feet).

Stockholm 2016	% sq. ft. of Buildings
LEED	11.99
BREEAM	0.64

LEED Adoption



BREEAM Adoption



METHODOLOGY

The green building adoption index for Stockholm includes office buildings certified under the BREEAM and LEED programs only. We do not incorporate Miljöbyggnad, the local scheme, as a building owner will automatically receive a bronze certification if complying with Swedish laws and building regulations/code. We include all certified assets within the CBRE market boundaries of the market. Information on the total number of buildings in the market is not available, just the total square meters. We apply a 5-year label window for both BREEAM and LEED. For BREEAM we only include "Final" certifications, all "Interim" certifications are excluded from the analysis. We exclude LEED for Commercial Interiors, focusing the analysis on LEED for New Construction, Core and Shell, and Existing Buildings. Moreover, we only include LEED and BREEAM-certified buildings that are owned by a corporate owner, investor, or for-profit organization.

Warsaw

Over the last decade Warsaw has significantly improved its transportation infrastructure and has benefitted from growing population. Over the next years these developments will further strengthen the position of Warsaw as a thriving office market. As the market is very active, competitive, and favorable for tenants, it offers significant potential for both new and existing occupiers.

Warsaw has witnessed a continuous supply of new buildings since the 2008 financial crisis. Last year the modern office stock in Warsaw surpassed 54 million square feet, doubling in the last 10 years. If the annual new supply of buildings continues to grow with the momentum recorded over the last decade, it is anticipated that the stock will double again and will reach 100 million square feet by 2027. Compared to other cities in the CEE, Warsaw is one of the most actively developing markets. Currently there is over 8.8 million square feet under construction in Warsaw.

This unique situation, created when high demand drives new speculative construction, is causing the vacancy rate to grow and keep rental rates low. Taking all this into account, the Warsaw office market is a favorable option for tenants as the multitude of leasing options with encouraging lease terms is increasing. Compared to the Western European capital cities there is still room for further development, both in terms of volume, and quality of office space.

The increasing number of leasing options as well as the strengthening position of tenants in the negotiation process observed over the last few years has caused a gradual decrease in prime space rents in Warsaw. Such a tenant's market has had an impact on incentives, including the amount of -free rent, and fit-out contributions provided by landlords, consequently lowering the effective rent levels on the Warsaw office market.

Over the last 12 months the prime rents have remained stable, estimated at EUR 23 per square meter per month. As the supply of prime office projects in the CBD is limited until the completion of Varso by HB Reavis in 2020, the level of prime space rents is unlikely to adjust.

RESULTS

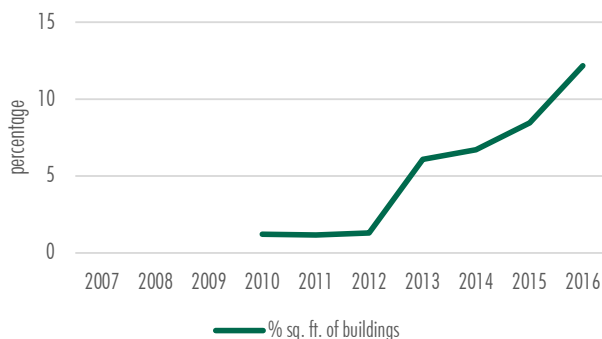
The Warsaw office market is the smallest, but a fast-growing market in the International Green Building Adoption Index, with 54 million square feet of space covered by the local CBRE market team. LEED and BREEAM are both actively adopted in this market. By the end of 2016, 21.3 percent of the market was certified by either one of these programs, representing 11.5 million square feet of green-certified office space. 36 buildings in Warsaw hold a BREEAM certification, representing 6.6 million square feet 19 buildings hold a LEED certification, or 5 million square feet of space. Just one building was certified under both programs.

METHODOLOGY

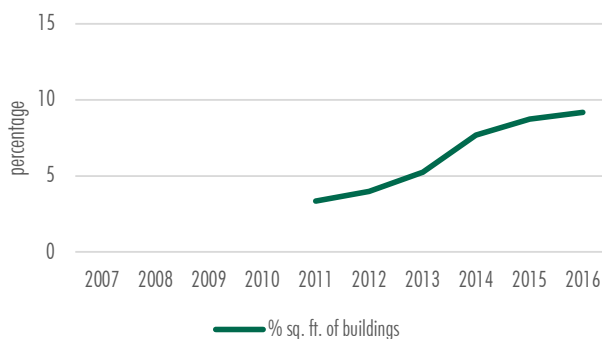
Note that green building certification in the Warsaw office market was virtually non-existent before 2010, when just 2 buildings, or 1.2 percent of the market, was certified. The green building adoption index for Warsaw includes office buildings certified under the BREEAM and LEED programs only. We include all certified assets within the CBRE market boundaries of the Warsaw market. Information on the total number of buildings in the market is not available, just the total square meters. We apply a 5-year label window for both BREEAM and LEED. For BREEAM we only include "Final" certifications, all "Interim" certifications are excluded from the analysis. Some BREEAM-certified buildings have

Warsaw 2016	% sq. ft. of Buildings
BREEAM	12.17
LEED	9.18

BREEAM Adoption



LEED Adoption



missing size information. Therefore, we are not able to include those in our estimations. We exclude LEED for Commercial Interiors, focusing the analysis on LEED for New Construction, Core and Shell, and Existing Buildings. Moreover, we only include LEED and BREEAM-certified buildings that are owned by a corporate owner, investor, or for-profit organization.

Appendix

PROGRAM	INSTITUTE	COUNTRY	YEAR OF INCEPTION	PROJECTS CERTIFIED	ASSESSMENT CATEGORIES	WEBSITE
BOMA BEST	BOMA	Canada	2005	2,291	Air, Comfort, Custodial, Energy, Health and Wellness, Purchasing, Site, Stakeholder Engagement, Waste, Water	http://bomacanada.ca/bomabest/
BREEAM	BRE	France, Poland, Sweden, the Netherlands, the United Kingdom (International)	1999	15,702 (worldwide)	Energy, Health and Well-Being, Innovation, Land Use, Materials, Management, Pollution, Transport, Waste, Water	https://www.breeam.com/
DGNB	DGNB	Germany, the Netherlands	2007	1,223 (worldwide)	Economic Quality, Environmental Quality, Process Quality, Sociocultural and Functional Quality, Technical Quality	http://www.dgnb-system.de/en/
Green Star	GBCA	Australia	2002	1,733	Emissions, Energy, Indoor Environment, Innovation, Land Use and Ecology, Management, Materials, Transport, Water	http://new.gbca.org.au/
HQE	GBC France	France	1996	380,000 (worldwide)	Energy, Environment, Health, Comfort	http://www.behqe.com/
LEED	USGBC/ GBCI	Canada, France, Germany, Poland, Sweden, the Netherlands, the United Kingdom (International)	2000	38,170 (worldwide)	Energy and Atmosphere, Indoor Environmental Air Quality, Innovation, Integrative Process, Location and Transportation, Materials and Resources, Regional Priority, Sustainable Sites, Water Efficiency	https://new.usgbc.org/leed
NABERS	NSW Government	Australia	1998	2,649	Energy, Water, Waste, Indoor Environment	https://nabers.gov.au/public/webpages/home.aspx

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